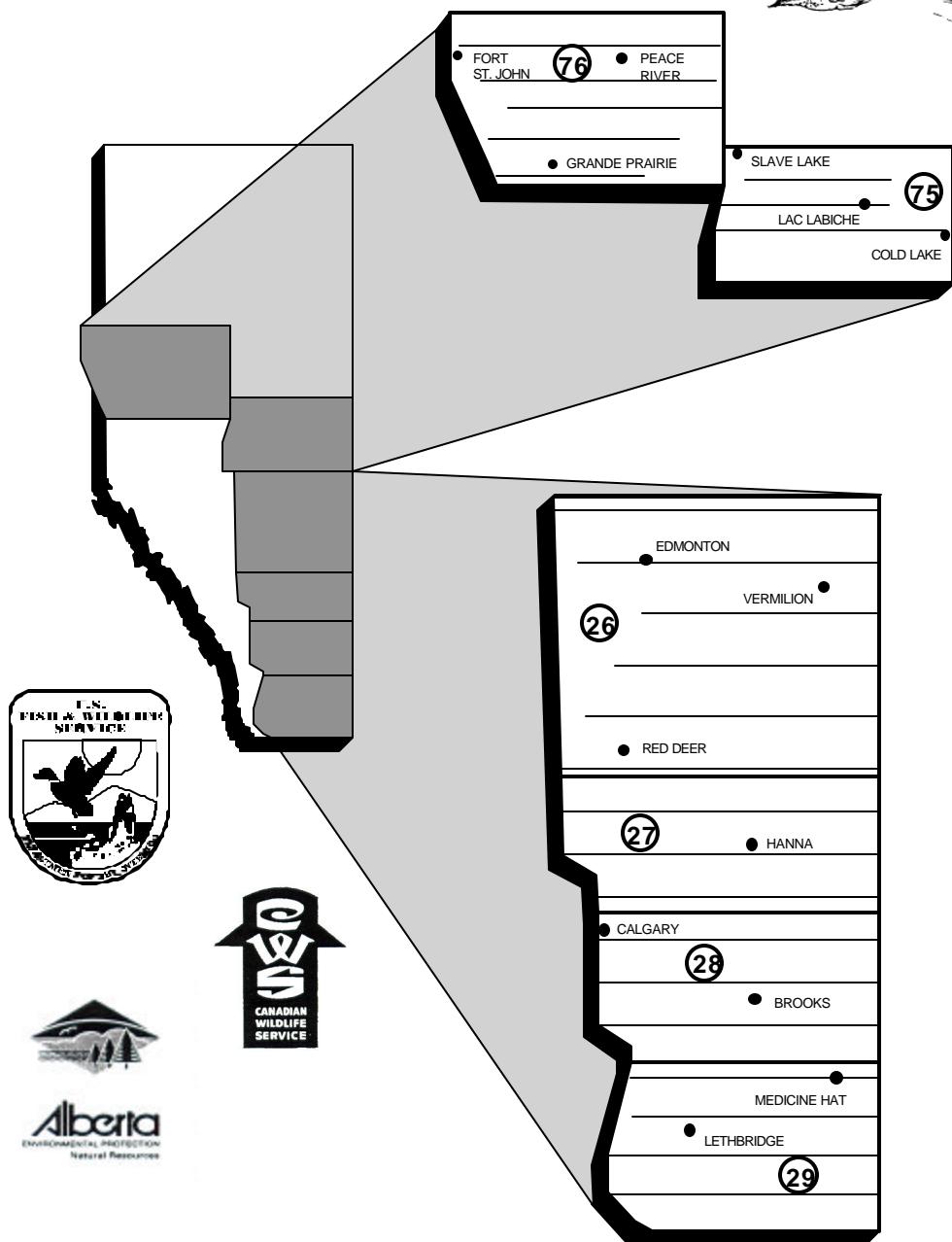
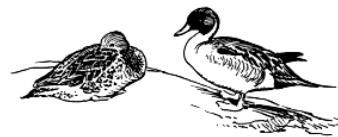


# WATERFOWL BREEDING POPULATION SURVEY

## SOUTHERN AND CENTRAL ALBERTA

### MAY 2006



Alberta  
ENVIRONMENTAL PROTECTION  
Natural Resources



**TITLE** Waterfowl Breeding Population and Habitat Survey for Southern and Central Alberta

**STRATA SURVEYED** 26, 27, 28, 29, 75, 76

**DATES** May 5-22, 2006

**DATA SUPPLIED BY**  
United States Fish and Wildlife Service (USFWS)  
Canadian Wildlife Service (CWS)  
Alberta Environmental Protection/Wildlife  
Management Division (AEP)  
Ducks Unlimited, Canada (DUC)

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**ABSTRACT**

The 2006 breeding population estimate for strata 26-29 (Southern Alberta) is 4,586,000 total ducks (Table 1), and increase of +44.2% from 2005, a increase of +47.8% from the recent ten-year mean (1996-2005) and an increase of +6.6% from the long-term mean (1955-2005). In Southern Alberta, total dabbling ducks (Table 1) increased +40.6% from 2005, increased +56.6% from the 1996-2005 ten-year mean and increased + 8.7% above the 1955-2005 long-term mean. Mallards (Table 1) increased +34.2% from 2005, Blue-winged Teal increased +33.1% from 2005 and Pintails increased +116.5% from 2005. Total diving ducks (Table 1) increased +68.2% from 2005, increased +12.7% from the 1996-2005 ten-year mean and decreased -1.9% from the 1955-2005

long-term mean. Total pond counts (Table 2) increased +32.7% in Southern Alberta from last year, increased +44.6% from the ten- year and +37.9% from the long term means.

The 2006 breeding population estimate for strata 75-76 (Central Alberta) is 1,498,400 total ducks (Table 4) a decrease of -1.1% from last year and an increase of +0.7% from the long-term(17 year) mean. Total dabbling ducks decreased -6.6 % from last year and decreased -1.8% from the 17-year mean. Mallards decreased -18.9% from 2005, and decreased -28.7% from the 17-year mean. Blue-winged Teal decreased -19.2% from last year and increased +16.4% from the 17-year mean. Pintails increased +75.8% from 2005 and increased +54.8% from the 17-year mean. Total diving ducks increased +8.7% from last year and increased +6.6% from the 17-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -15.9% from last year and decreased -0.5% from the 17-year mean.

## **METHODS**

The procedures followed in conducting the survey are contained in the Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys, Section III, revised April 1987. The analytical and procedural changes, described in the 1991 and 1992 reports, continued this year. As a result, measures of precision are now available with the population estimates. This years and the last ten years reports reflects a major change made to the historical (1955-1995) database of breeding waterfowl and habitat estimates. Nonparametric regression methods were used to predict population values for years in which no survey was conducted in a stratum. An internal report (Office of Migratory Bird Management, Laurel, MD) describes how and for which cases prediction was done.

Air-ground segment data in Central Alberta's strata 75 and 76(12- air/ground segments = 13% of the survey area) are not sufficient to compute accurate visibility correction factors (VCF's) for all duck species. Stratum 26 more closely resembles the habitat of 75 and 76 than the other Southern Alberta strata (27-29). It was decided to combine air-ground data from strata 26, 75 and 76, when calculating VCF's for strata 75 and 76. Acceptable standard errors and variances were obtained when this was done. Southern Alberta VCF's are still calculated with data from strata 26-29 only (37- air/ground segments = 25% of the survey area).

In 1996, Canada goose breeding population estimates were corrected for visibility bias based on data collected by air and ground survey crews in this reporting region. For validity of comparisons to means for previous years, historical Canada goose population indices were also adjusted for visibility bias using data collected by all air and ground survey crews throughout the Canadian and U.S. prairie regions in 1996. Therefore, estimates and means reported here cannot be directly compared with those in reports written before 1996 for this region.

Air data were compiled using a notebook computer. All areas in the current survey design (Tables 3 and 6) were flown. The survey was conducted using the same aerial crew and aircraft, a Cessna 206, for strata 26-29, 75 and 76. This was the 18th year of flying aerial waterfowl surveys for the pilot/observer and the 3rd year for the aerial observer. All air and ground crew members participated in pre-survey training.

The Alberta ground crew did reconnaissance of the survey area and concluded that most species observed appeared paired by May 4. Most deciduous tree species were leafed out and the season timing appeared normal in southern areas . The survey was initiated on May 5 for Southern Alberta

and completed on May 16. The Central Alberta survey commenced on May 16 and concluded on May 22. A total of 65 flight hours was required to complete the survey.

### **WEATHER AND HABITAT CONDITIONS**

Environment Canada reports that the natural runoff this year is forecasted to be below average to average in Alberta. For the period between May and September 2006, Alberta Environment is forecasting natural runoff volumes ranging from below average to average for the Bow, Oldman and Milk River basins, and below average natural runoff volumes for the Red Deer and North Saskatchewan River basins. Mountain snow accumulations as of May 1 in the Red Deer, North Saskatchewan and Athabasca River basins were much below average. Snowpack to the south is generally much better; below average to average in the Oldman River basin and near average in the Bow River basin, except for the Highwood River basin where snowpack is below to much below average. Conditions improved slightly since last month in the upper Bow River basin, but were steady elsewhere. As a result of early snowmelt due to warm weather, and wet soil conditions remaining from last year's heavy rains, natural runoff volumes recorded during March and April were average to above average in the Oldman and Milk River basins, and were above average in most areas of the Bow River basin. In the Highwood, Red Deer and North Saskatchewan River basins, natural runoff volumes have been generally below average to average. Precipitation during April was much below normal in the northwest and most of central Alberta, and in the Medicine Hat area. Northeastern and the rest of southern Alberta, as well as a narrow area just west of Edmonton and Red Deer, recorded above to much above normal precipitation. Precipitation in the mountains generally varied from below normal to above normal.

Winter precipitation (November 1, 2005 to April 30, 2006) was much below normal in most of northern and central Alberta, and generally ranged from below normal to normal in southern Alberta.

### **BREEDING POPULATION INDICES**

A listing of all birds and the respective comparisons can be found in Tables 1 and 4, the Trend Graphs and Appendices 1 and 2.

### **SOUTHERN ALBERTA**

. The 2006 breeding population estimate for strata 26-29 (Southern Alberta) is 4,586,000 total ducks (Table 1), and increase of +44.2% from 2005, a increase of +47.8% from the recent ten-year mean (1996-2005) and an increase of +6.6% from the long-term mean (1955-2005). In Southern Alberta, total dabbling ducks (Table 1) increased +40.6% from 2005, increased +56.6% from the 1996-2005 ten-year mean and increased + 8.7% above the 1955-2005 long-term mean. Mallards (Table 1) increased +34.2% from 2005, Blue-winged Teal increased +33.1% from 2005 and Pintails increased +116.5% from 2005. Total diving ducks (Table 1) increased +68.2% from 2005, increased +12.7% from the 1996-2005 ten-year mean and decreased -1.9% from the 1955-2005 long-term mean. Total pond counts (Table 2) increased +32.7% in Southern Alberta from last year, increased +44.6% from the ten- year and +37.9% from the long term means.

## **CENTRAL ALBERTA**

The 2006 breeding population estimate for strata 75-76 (Central Alberta) is 1,498,400 total ducks (Table 4) a decrease of -1.1% from last year and an increase of +0.7% from the long-term(17 year) mean. Total dabbling ducks decreased -6.6 % from last year and decreased -1.8% from the 17-year mean. Mallards decreased -18% from 2005, and decreased -28.7% from the 17-year mean. Blue-winged Teal decreased -19.2% from last year and increased +16.4% from the 17-year mean. Pintails increased +75.8% from 2005 and increased +54.8% from the 17-year mean. Total diving ducks increased +8.7% from last year and increased +6.6% from the 17-year mean. Total ponds (Table 5) in Stratum 75 and 76 decreased -15.9% from last year and decreased -0.5% from the 17-year mean.

## **CONCLUSIONS**

- 1) Eight of the past 10 years in Southern Alberta have seen drought conditions. Despite a dry fall and mild dry winter, we saw improved habitat conditions this year in the historically important pintail breeding region of the prairies and Aspen Parklands.
- 2) Spring timing was near normal this year. It was a very wet/rainy spring through out Alberta which should help maintain the wetlands and aid nesting success.
- 3) Habitat conditions in the Peace Parklands of stratum 76 declined from last year.

Sincere appreciation is extended to all who participated in this survey. Thank you to the Winnipeg Climate Center and Alberta Agriculture for precipitation data and soil moisture maps.

Submitted by: Elizabeth Huggins-Flyway Biologist

Date: July 6, 2006

Table 1. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparison against the previous year, the previous 10-year mean, and the long-term mean for Southern Alberta.

Species/Ponds	Stratum (2006)						10-Year Mean	Long-Term Mean	% Change From			
	26	27	28	29	2006 Total	2005 Total			2005	Mean	Long-Term Mean	
<b>Ducks</b>												
<b>Dabblers</b>												
Mallard	397.7	158.1	205.9	139.1	900.7	671.4	792.8	1098.7	34.2%	13.6%	-18.0%	
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	-100.0%	
Gadwall	252.1	62.6	75.6	64.9	455.2	338.2	317.5	308.7	34.6%	43.4%	47.5%	
Am. wigeon	83.3	27.1	57.7	20.4	188.6	125.5	157.5	296.4	50.3%	19.8%	-36.4%	
Am. green-winged teal	90.9	34.3	30.3	22.3	177.9	158.5	195.6	193.8	12.2%	-9.1%	-8.2%	
Blue-winged teal	519.2	156.5	122.7	66.0	864.3	649.2	429.9	608.5	33.1%	101.0%	42.0%	
N. shoveler	358.5	133.0	147.9	61.4	700.8	547.6	385.7	360.1	28.0%	81.7%	94.6%	
N. pintail	180.9	132.1	175.3	122.7	611.0	282.3	211.1	721.3	116.5%	189.4%	-15.3%	
Subtotal	1882.6	703.8	815.4	496.8	3898.5	2772.6	2490.2	3587.5	40.6%	56.6%	8.7%	
<b>Divers</b>												
Redhead	124.2	8.2	11.4	10.4	154.3	91.3	108.0	116.3	68.9%	42.8%	32.6%	
Canvasback	48.8	11.8	8.3	7.5	76.3	42.7	54.2	63.6	78.7%	40.7%	19.9%	
Scaups	134.1	19.7	33.2	26.9	213.9	126.5	225.9	353.2	69.1%	-5.3%	-39.4%	
Ring-necked duck	11.3	3.4	3.5	3.2	21.5	12.9	24.3	17.8	66.6%	-11.7%	20.9%	
Goldeneyes	48.1	2.3	0.0	0.0	50.4	10.6	19.0	14.7	375.8%	164.7%	242.9%	
Bufflehead	94.1	2.1	7.5	3.9	107.6	78.9	74.8	49.3	36.4%	43.9%	118.3%	
Ruddy Duck	28.2	3.0	11.0	16.1	58.3	42.7	99.0	80.6	36.5%	-41.1%	-27.7%	
Subtotal	488.8	50.4	75.0	68.0	682.2	405.6	605.3	695.5	68.2%	12.7%	-1.9%	
<b>Miscellaneous</b>												
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	-100.0%	
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--	
Scoters	3.7	0.6	0.0	0.0	4.3	0.3	0.5	12.6	1529.8%	714.3%	-66.2%	
Mergansers	0.9	0.0	0.4	0.3	1.6	1.9	6.2	6.6	-15.6%	-73.7%	-75.4%	
Subtotal	4.5	0.6	0.4	0.3	5.9	2.2	6.7	19.3	169.4%	-12.3%	-69.4%	
Total Ducks	2375.9	754.8	890.8	565.1	4586.6	3180.4	3102.2	4302.3	44.2%	47.8%	6.6%	
Canada Goose	95.9	21.5	30.9	33.2	181.5	212.2	191.3	75.0	-14.5%	-5.1%	142.1%	
Am. coot	205.5	72.4	75.6	65.4	419.0	240.9	292.0	231.6	73.9%	43.5%	80.9%	
Ponds	539.8	165.2	170.6	120.2	995.8	750.4	688.5	722.0	32.7%	44.6%	37.9%	

Table 2. Long term-trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean for Southern Alberta.

Year	Stratum (2006)				Total
	26	27	28	29	
1961	358.2	105.8	82	49.8	595.7
1962	395.5	84.9	73.2	52.5	606.2
1963	543.0	127.9	49.1	57.6	777.6
1964	366.7	97.1	62.1	118.6	644.5
1965	601.7	197.5	95.5	104.2	998.8
1966	490.2	162.6	134.9	76.2	863.9
1967	377.5	155.9	215.8	169.9	919.1
1968	266.1	43.6	47.3	80.9	438.0
1969	483.2	156.4	125.3	94.5	859.5
1970	531.2	187.1	86.5	77.8	882.7
1971	585.4	196.6	121.4	78.0	981.4
1972	517.1	92.7	60.1	61.2	731.1
1973	683.9	136.4	121.3	83.6	1025.2
1974	947.3	259.1	124.1	64.1	1394.6
1975	428.2	205.8	178.3	145.6	957.9
1976	459.6	144.2	104.1	123.7	831.6
1977	433.8	53.0	45.4	55.8	588.0
1978	295.8	89.8	88.6	145.6	619.9
1979	617.2	124.9	100.7	153.7	996.4
1980	281.2	68.1	59.1	52.1	460.6
1981	365.2	80.5	58.9	64.7	569.3
1982	374.6	86.4	66.8	103.3	631.1
1983	318.7	56.0	58.0	64.3	497.1
1984	386.4	69.8	42.9	38.8	537.9
1985	493.5	170.2	89.3	75.3	828.3
1986	514.5	70.7	46.4	96.0	727.5
1987	325.0	151.5	58.1	72.1	606.8
1988	229.3	61.6	52.7	74.3	417.9
1989	274.0	111.2	57.8	105.9	548.9
1990	467.9	116.4	66.2	121.7	772.1
1991	445.7	83.1	73.5	93.4	695.7
1992	328.1	78.3	48.0	48.8	503.2
1993	344.0	139.1	90.7	115.9	689.8
1994	406.1	122.5	69.8	122.0	720.4
1995	417.9	93.2	58.8	118.8	688.7
1996	522.1	138.4	130.5	112.9	903.9
1997	653.6	199.0	143.2	104.6	1100.4
1998	358.1	78.7	66.3	56.2	559.3
1999	469.5	104.6	67.2	74.7	716.0
2000	345.9	89.3	63.1	54.8	553.1
2001	226.4	67.6	56.6	75.1	425.7
2002	249.4	80.1	59.9	87.5	476.9
2003	384.1	167.2	159.5	177.7	888.4
2004	271.0	61.8	97.6	80.3	510.7
2005	539.6	98.2	53.0	59.6	750.4
2006	539.8	165.2	170.6	120.2	995.8
10-year Mean	402.0	108.5	89.7	88.3	688.5
Long-term Mean	430.5	117.0	84.7	89.9	722.0
Percent Change:					
From 2005	0.0%	68.2%	222.0%	101.8%	32.7%
From 10-year Mean	34.3%	52.3%	90.2%	36.1%	44.6%
From Long-term Mean	25.4%	41.2%	101.5%	33.8%	37.9%

Table 3. Survey design for Southern Alberta, May 2006.

	<u>STRATUM</u>				
	26	27	28	29	Total
<u>Survey design</u>					
Square miles in stratum	26,448	11,724	12,890	13,235	64,297
Square miles in sample-waterfowl	544.5	288.0	310.5	171.0	1,314
Square miles in sample-ponds	272.3	144.0	155.25	85.5	657
Lineal miles in sample	2,178	1,152	1,242	684	5,256
Number of transects in sample	11	6	7	4	28
Number of segments in sample	121	64	69	38	292
Expansion factor	48.5730	40.7083	41.5137	77.3977	---
<u>Current year coverage</u>					
Square miles in sample-waterfowl	256.5	144.0	130.5	171.0	697.5
Square miles in sample-ponds	126.0	72.0	65.25	85.5	348.75
Lineal miles in sample	1,008	576	522	684	2,790
Number of transects in sample	6	3	3	4	16
Number of segments in sample	57	32	29	38	155
Expansion factor	103.11	81.42	98.77	77.40	—

Appendix 1. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Southern Alberta.

Species/Ponds	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Ducks										
Dabblers										
Mallard	1907.0	1757.6	1986.7	2072.2	1753.0	1502.4	1330.9	983.1	1227.9	1119.4
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	200.3	269.9	187.1	219.6	275.7	369.2	279.6	207.8	198.8	256.6
Am. wigeon	582.3	535.6	535.8	548.9	616.0	539.9	502.3	380.1	315.2	346.3
Am. green-winged teal	351.3	182.2	186.2	205.1	324.4	262.3	320.6	63.4	72.8	114.6
Blue-winged teal	1550.2	903.8	908.6	1078.5	903.6	877.8	897.1	346.7	426.8	634.6
N. shoveler	397.2	405.0	349.8	442.3	321.1	431.9	303.5	196.8	378.0	342.0
N. pintail	1591.5	1521.5	1250.6	1223.9	832.6	1087.5	513.3	328.6	811.9	417.6
Subtotal	6579.8	5575.5	5404.8	5790.4	5026.5	5071.0	4147.3	2506.6	3431.5	3231.1
Divers										
Redhead	140.5	145.7	105.9	127.2	113.2	71.3	78.1	44.3	79.6	88.6
Canvasback	96.2	98.7	100.6	168.7	78.1	58.3	63.9	54.6	77.6	83.8
Scaups	427.2	483.2	515.1	490.6	400.2	325.8	393.6	231.9	358.5	400.5
Ring-necked duck	1.4	8.8	1.5	4.5	9.4	2.9	10.1	2.1	1.7	3.4
Goldeneyes	16.0	21.1	15.5	9.1	8.7	11.4	11.2	7.9	2.4	5.9
Bufflehead	26.1	36.6	33.8	39.5	44.6	32.9	53.2	22.1	26.5	24.4
Ruddy Duck	76.2	78.3	43.4	51.6	79.2	97.9	49.8	21.9	37.4	93.0
Subtotal	783.7	872.4	815.8	891.1	733.5	600.4	660.0	384.9	583.8	699.5
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	0.0	28.0	21.6	20.6	26.9	18.9	25.6	25.2	16.4	17.1
Mergansers	0.0	0.0	0.0	5.9	4.0	1.2	0.4	0.0	0.0	1.6
Subtotal	0.0	28.0	21.6	26.5	30.9	20.1	26.0	25.2	16.4	18.7
Total Ducks	7363.6	6475.9	6242.1	6708.1	5790.9	5691.5	4833.3	2916.7	4031.7	3949.3
Canada Goose	0.0	0.7	17.2	35.4	31.2	50.6	37.9	24.7	34.1	38.0
Am. coot	141.3	108.0	56.6	98.1	169.8	120.1	92.9	19.7	82.2	40.0
Ponds							595.7	606.2	777.6	644.5

Species/Ponds	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Ducks										
Dabblers										
Mallard	893.9	1546.7	1502.4	912.0	1121.4	1594.6	1871.3	1825.3	1729.5	1576.2
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	200.3	479.6	415.8	491.6	339.0	343.3	362.8	444.9	281.0	495.6
Am. wigeon	320.9	385.5	485.3	467.5	403.8	434.3	502.0	448.4	394.1	514.5
Am. green-winged teal	117.2	176.1	175.0	121.5	204.5	203.6	263.3	288.1	311.9	404.8
Blue-winged teal	494.1	533.2	712.9	325.3	363.2	440.9	714.3	494.9	459.2	1209.7
N. shoveler	276.2	470.8	538.5	394.6	433.3	329.1	423.6	435.7	466.1	588.0
N. pintail	777.1	1265.2	1559.5	501.6	1584.5	1366.4	1763.1	1716.4	1025.1	2123.1
Subtotal	3079.8	4857.2	5389.4	3214.1	4449.8	4712.1	5900.4	5653.8	4666.9	6911.9
Divers										
Redhead	93.3	190.1	194.4	85.0	117.8	74.7	68.7	118.1	89.1	155.3
Canvasback	100.5	68.5	97.9	57.9	26.7	49.4	39.0	65.5	54.0	100.2
Scaups	306.5	238.7	346.8	234.0	350.9	367.9	299.5	426.8	588.9	368.6
Ring-necked duck	11.0	4.3	34.8	11.0	8.7	14.2	36.2	30.6	2.0	15.1
Goldeneyes	1.5	4.9	0.0	5.6	8.9	3.6	20.4	15.6	19.7	17.7
Bufflehead	71.1	33.4	48.6	32.4	44.1	40.4	33.8	53.3	30.6	26.0
Ruddy Duck	93.4	83.0	111.9	96.7	47.9	66.9	56.7	102.0	38.2	93.3
Subtotal	677.3	623.0	834.4	522.7	605.0	617.1	554.4	811.9	822.5	776.3
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	16.9	20.0	23.6	17.5	21.6	23.2	12.1	13.2	16.0	8.0
Mergansers	9.3	7.7	1.8	1.1	1.7	9.4	4.1	4.2	2.1	0.0
Subtotal	26.1	27.7	25.4	18.6	23.3	32.7	16.1	17.4	18.1	8.0
Total Ducks	3783.3	5507.9	6249.2	3755.4	5078.0	5361.9	6470.9	6483.0	5507.5	7696.2
Canada Goose	24.0	19.0	34.6	15.0	23.5	28.4	50.0	30.5	35.7	29.2
Am. coot	65.1	48.1	202.5	98.8	144.8	169.8	99.7	122.6	145.4	267.0
Ponds	998.8	863.9	919.1	438.0	859.5	882.7	981.4	731.1	1025.2	1394.6

Appendix 1 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Southern Alberta.

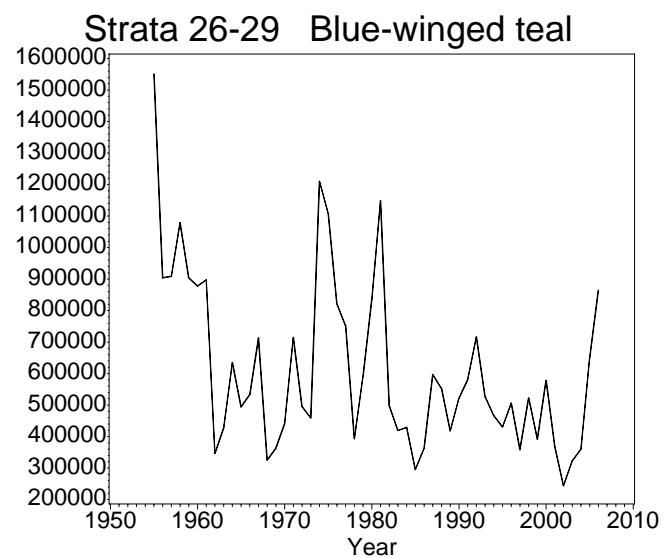
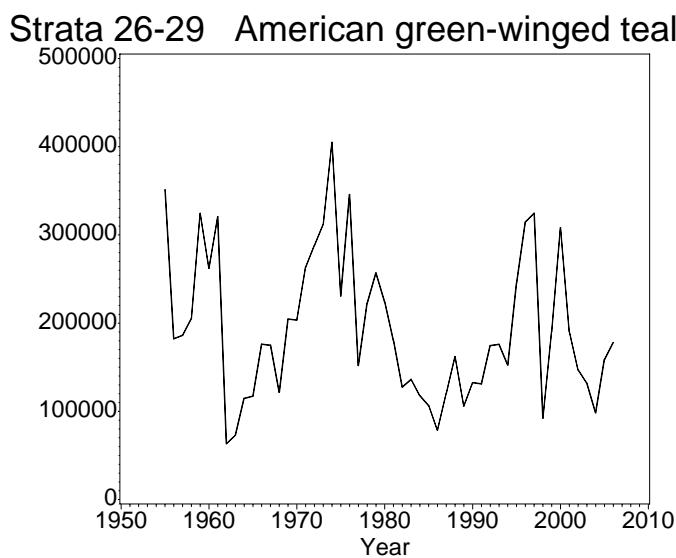
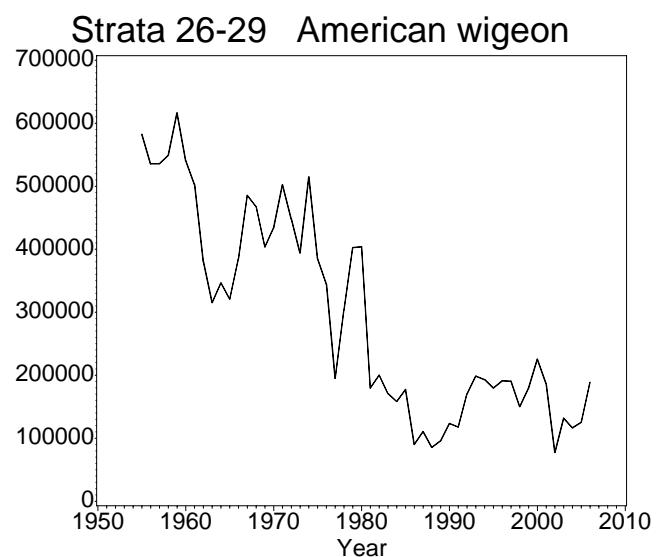
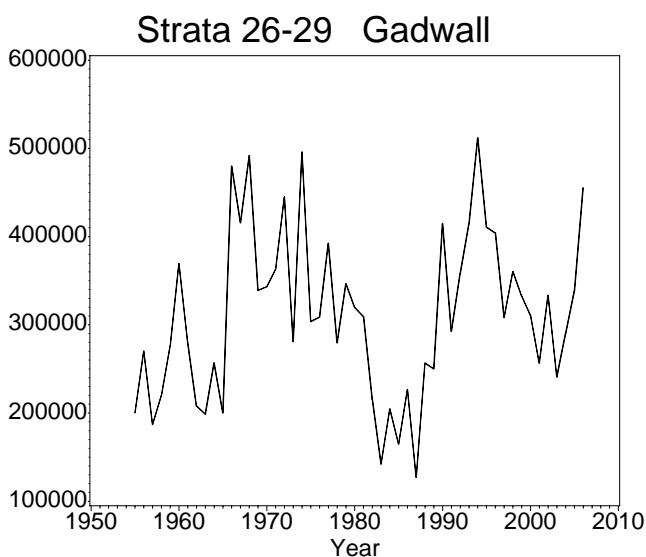
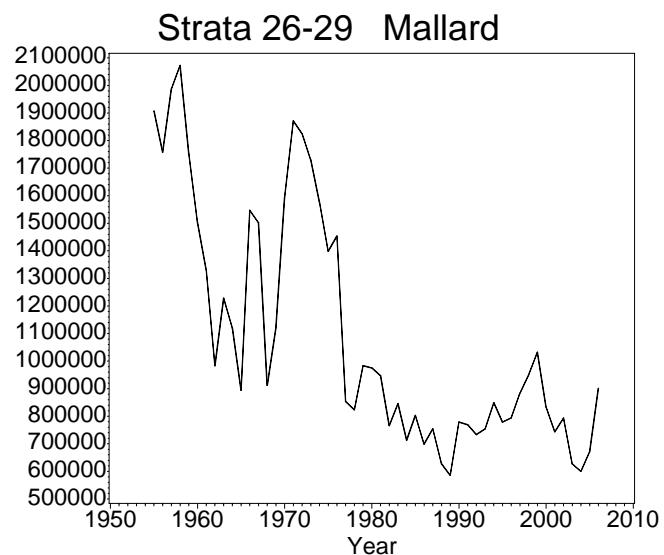
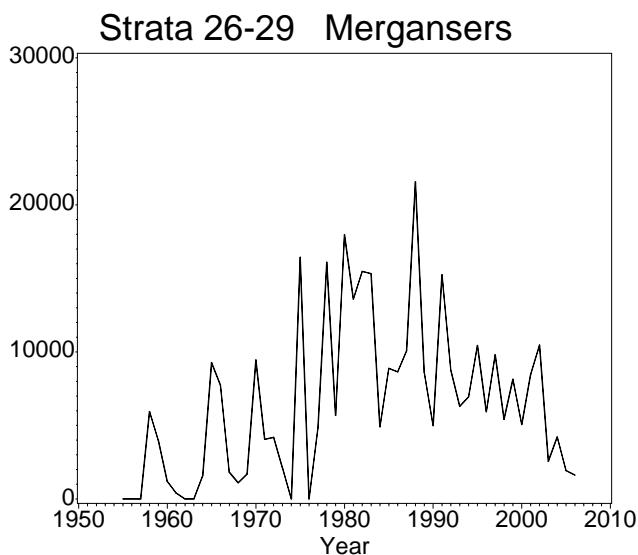
Species/Ponds	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Ducks										
Dabblers										
Mallard	1398.3	1453.6	853.3	823.5	983.1	975.2	947.1	765.8	845.6	713.0
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Gadwall	303.7	308.7	392.2	279.7	346.4	319.6	309.4	215.5	142.3	204.4
Am. wigeon	384.3	344.5	194.9	303.5	402.5	403.9	179.8	200.0	170.9	158.4
Am. green-winged teal	230.8	345.6	151.9	222.3	256.8	224.0	180.1	127.5	136.2	117.7
Blue-winged teal	1108.2	820.3	751.0	393.2	592.9	834.6	1148.1	498.1	419.1	429.2
N. shoveler	550.3	325.0	220.8	259.0	391.4	388.8	503.9	320.4	200.3	187.3
N. pintail	1553.1	956.5	345.8	1087.6	1456.4	842.3	657.3	576.8	380.8	299.8
Subtotal	5528.7	4554.3	2909.8	3368.7	4429.5	3988.3	3926.1	2704.1	2295.1	2109.9
Divers										
Redhead	181.7	173.4	202.1	133.8	100.7	268.4	111.1	57.8	60.4	98.3
Canvasback	78.9	52.1	64.6	51.2	53.5	62.1	49.4	73.8	49.7	26.6
Scaups	382.7	625.9	477.7	463.0	687.5	473.0	469.3	522.1	491.9	367.5
Ring-necked duck	26.0	13.5	23.9	50.9	21.3	8.9	29.5	23.7	12.7	33.6
Goldeneyes	15.5	28.3	3.9	33.2	7.6	29.6	4.6	6.8	6.8	1.7
Bufflehead	56.1	47.3	35.2	60.6	67.2	32.3	55.5	42.2	57.4	25.8
Ruddy Duck	184.7	33.6	101.5	75.5	42.0	33.9	63.0	116.0	72.9	62.3
Subtotal	925.7	974.1	908.9	868.3	979.7	908.2	782.5	842.4	751.8	615.8
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	7.3	24.1	13.5	26.0	36.2	20.4	7.7	11.8	6.4	17.3
Mergansers	16.4	0.0	4.8	16.1	5.7	18.0	13.6	15.5	15.3	4.9
Subtotal	23.8	24.1	18.3	42.1	41.9	38.3	21.3	27.9	21.7	22.2
Total Ducks	6478.2	5552.5	3837.0	4279.1	5451.1	4934.9	4729.8	3574.4	3068.6	2748.0
Canada Goose	30.2	19.8	23.8	30.2	35.5	21.1	45.6	40.3	41.7	46.8
Am. coot	483.3	83.5	285.4	168.4	418.0	501.1	405.0	371.7	253.2	542.7
Ponds	957.9	831.6	588.0	619.9	996.4	460.6	569.3	631.1	497.1	537.9

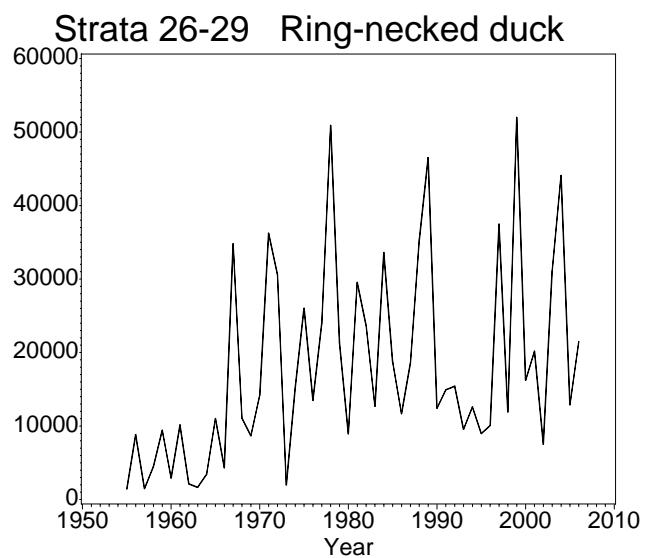
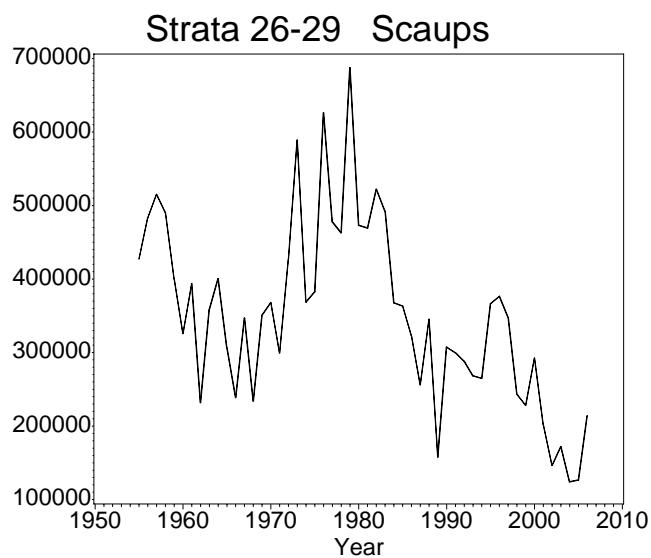
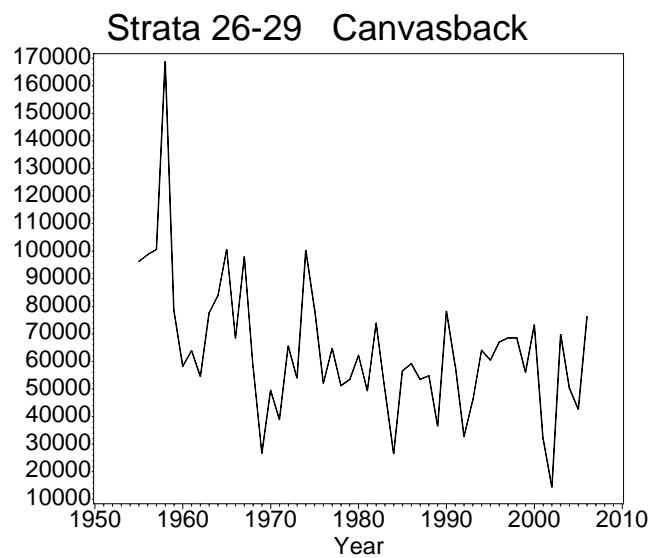
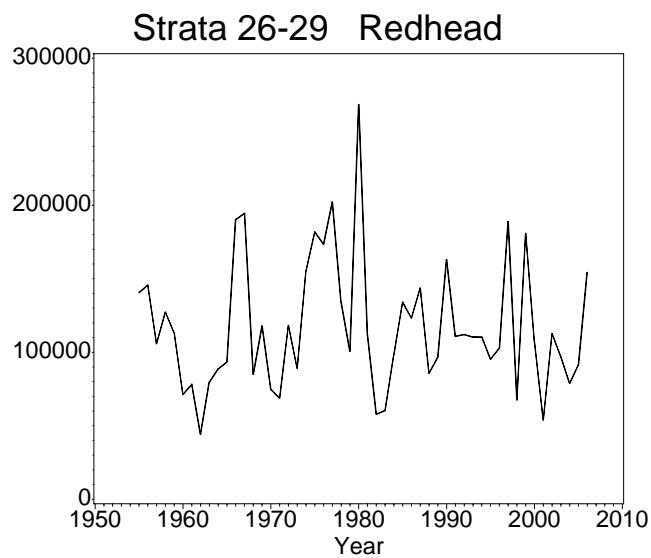
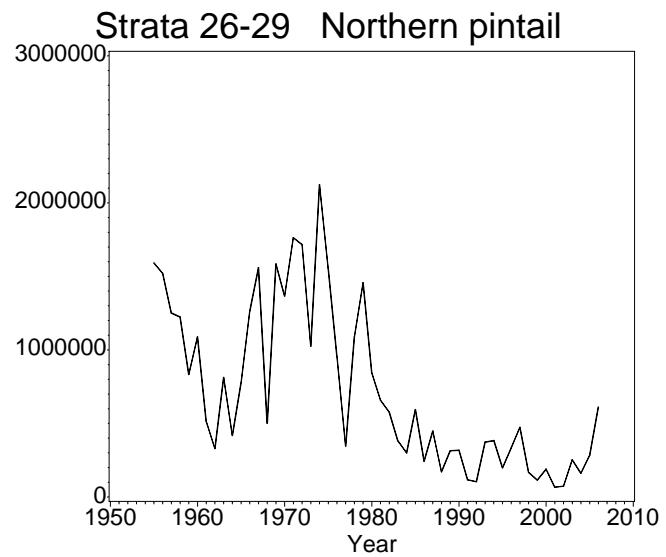
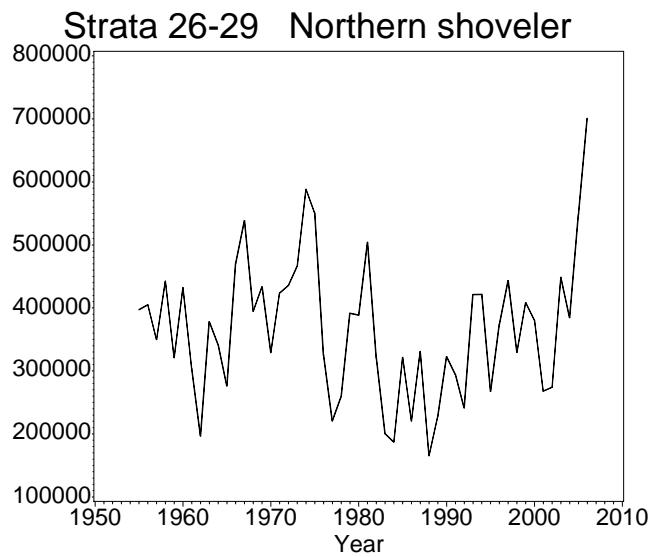
Species/Ponds	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Ducks										
Dabblers										
Mallard	803.0	698.8	753.9	627.4	585.9	778.7	769.2	733.5	753.8	848.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	164.9	226.4	127.1	256.4	250.2	414.4	292.7	358.0	414.3	511.7
Am. wigeon	177.3	90.2	110.4	85.5	95.9	123.2	117.9	170.3	198.5	193.2
Am. green-winged teal	106.7	78.7	120.3	162.0	106.0	132.5	131.1	174.4	175.9	152.6
Blue-winged teal	295.3	361.9	596.6	552.9	418.2	521.2	580.2	716.1	526.6	466.6
N. shoveler	321.2	220.7	330.7	165.6	227.9	322.5	294.5	241.4	421.1	421.4
N. pintail	593.4	242.6	447.4	171.4	313.6	317.7	116.3	103.9	372.5	383.4
Subtotal	2461.7	1919.3	2486.4	2021.3	1997.7	2610.3	2301.9	2497.7	2862.8	2977.7
Divers										
Redhead	133.9	123.3	143.5	85.7	96.6	162.8	110.8	112.0	110.3	110.3
Canvasback	56.6	59.2	53.5	54.8	36.7	78.1	58.4	32.8	45.9	64.0
Scaups	363.2	322.7	256.2	345.2	158.0	307.3	299.8	288.0	268.4	265.0
Ring-necked duck	18.7	11.7	18.6	35.3	46.5	12.4	14.9	15.4	9.6	12.6
Goldeneyes	16.2	29.9	24.2	31.6	16.1	19.3	10.6	10.1	9.5	15.1
Bufflehead	17.0	33.8	22.7	50.8	32.5	36.5	80.0	67.6	79.6	43.1
Ruddy Duck	43.8	32.9	35.8	77.9	65.6	129.9	193.8	85.2	57.1	65.5
Subtotal	649.4	613.5	554.4	681.3	451.9	746.4	768.3	611.1	580.3	575.5
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	18.6	17.2	1.1	7.2	5.6	9.9	15.5	4.4	0.8	5.2
Mergansers	8.9	8.6	10.1	21.6	8.6	5.0	15.2	8.7	6.3	6.9
Subtotal	27.5	25.8	11.1	28.8	14.2	14.9	31.1	13.1	7.1	12.1
Total Ducks	3138.6	2558.7	3052.0	2731.3	2463.9	3371.6	3101.3	3121.9	3450.1	3565.3
Canada Goose	49.6	79.6	59.0	95.5	79.3	113.8	66.8	100.1	85.1	129.0
Am. coot	327.3	282.2	137.9	166.1	349.5	485.7	279.7	307.4	282.1	234.7
Ponds	828.3	727.5	606.8	417.9	548.9	772.1	695.7	503.2	689.8	720.4

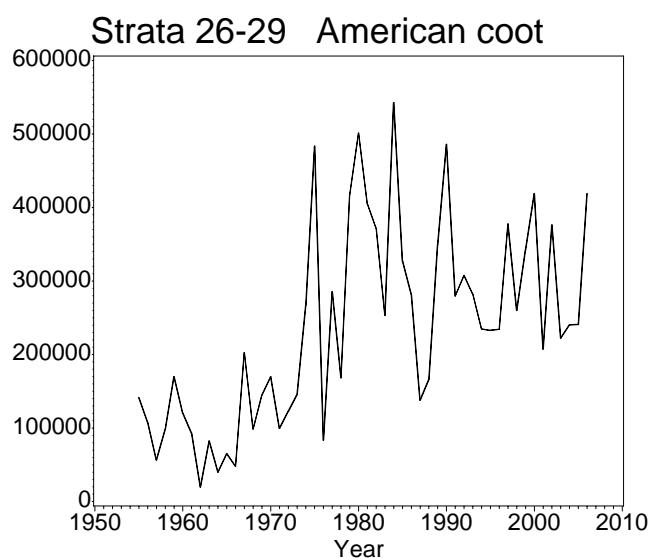
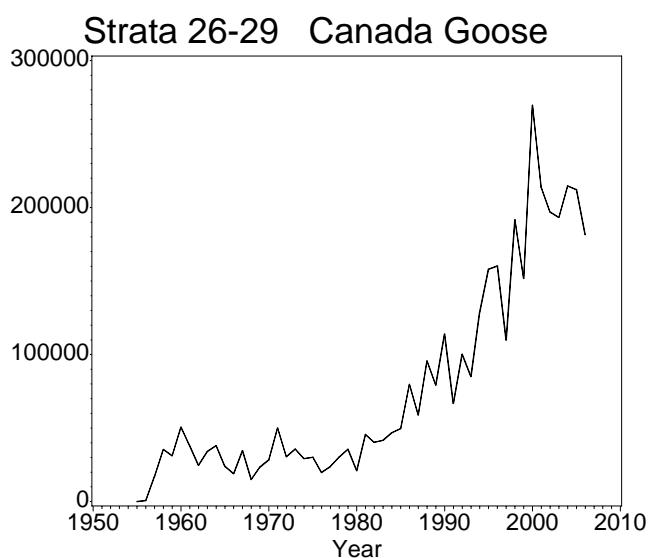
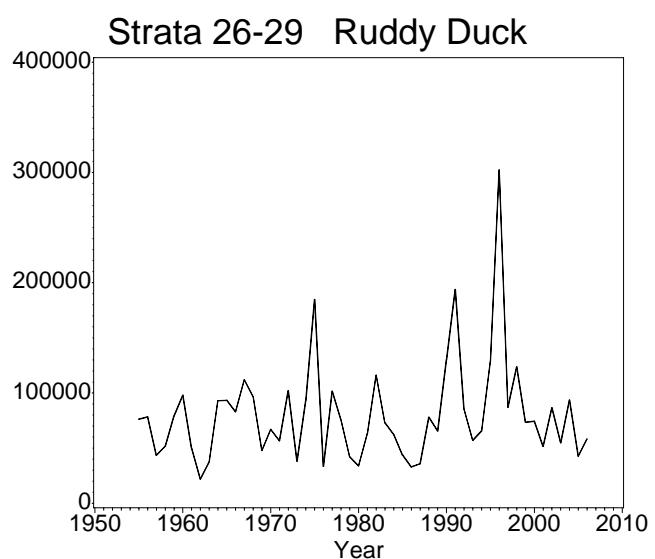
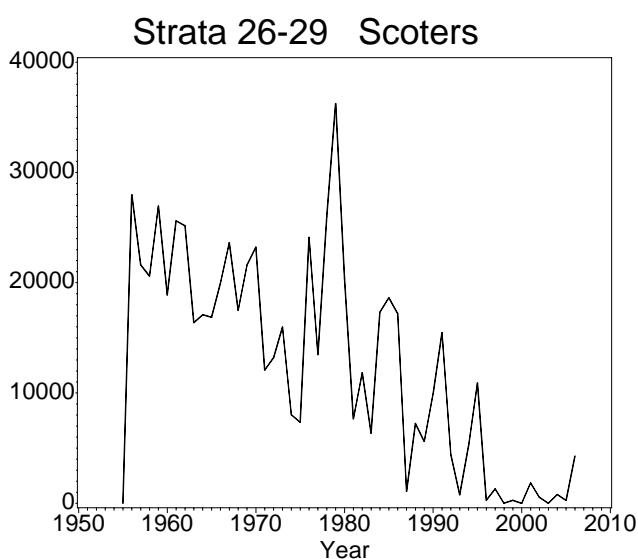
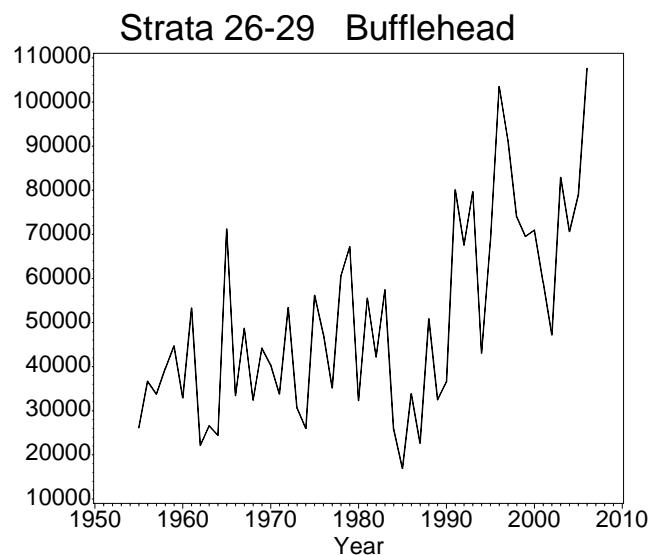
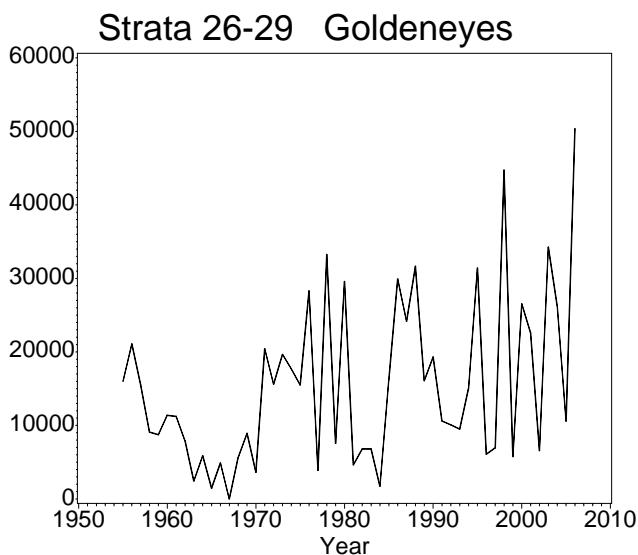
Appendix 1 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Southern Alberta.

Species/Ponds	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Ducks										
Dabblers										
Mallard	778.5	793.8	883.6	950.1	1031.8	833.2	743.8	793.3	627.1	600.1
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	410.6	404.2	308.3	360.2	332.5	310.9	256.8	333.4	240.9	289.9
Am. wigeon	179.8	191.1	190.5	150.3	179.6	225.2	186.8	77.5	131.6	116.6
Am. green-winged teal	245.3	314.5	324.4	92.2	190.5	308.1	190.5	147.0	131.8	98.4
Blue-winged teal	430.8	505.9	358.5	521.9	391.5	577.8	367.8	244.2	322.6	360.2
N. shoveler	267.6	373.8	443.2	329.4	408.2	380.4	267.8	274.0	448.4	384.6
N. pintail	198.2	333.5	472.8	166.3	115.0	188.8	66.1	73.0	251.9	161.3
Subtotal	2510.7	2916.8	2981.3	2570.5	2649.2	2824.4	2079.5	1942.3	2154.3	2011.2
Divers										
Redhead	95.2	102.7	188.9	67.6	180.7	106.8	54.0	112.5	96.9	78.9
Canvasback	60.5	67.0	68.5	68.6	56.1	73.2	31.9	14.5	69.7	50.2
Scaups	366.5	376.4	347.7	243.1	228.2	292.3	201.9	146.5	172.1	124.1
Ring-necked duck	9.0	10.1	37.4	11.9	52.0	16.2	20.2	7.5	31.1	44.1
Goldeneyes	31.4	6.1	6.9	44.7	5.8	26.5	22.6	6.6	34.2	26.3
Bufflehead	68.3	103.5	91.3	73.9	69.5	70.9	59.2	47.2	82.9	70.6
Ruddy Duck	128.5	302.2	87.1	123.6	73.4	74.3	51.6	86.5	54.9	93.5
Subtotal	759.4	967.8	827.9	633.3	665.8	660.3	441.3	421.3	541.7	487.6
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	10.9	0.3	1.3	0.0	0.3	0.0	1.8	0.5	0.0	0.8
Mergansers	10.4	5.9	9.8	5.4	8.1	5.1	8.5	10.5	2.6	4.2
Subtotal	21.3	6.2	11.1	5.4	8.4	5.1	10.3	11.0	2.6	5.0
Total Ducks	3291.4	3890.9	3820.2	3209.2	3323.4	3489.7	2531.1	2374.5	2698.6	2503.8
Canada Goose	158.0	160.2	109.8	191.6	151.8	269.5	213.5	196.9	193.3	214.6
Am. coot	232.9	234.4	377.5	260.0	342.3	418.8	207.4	376.1	222.3	240.2
Ponds	688.7	903.9	1100.4	559.3	716.0	553.1	425.7	476.9	888.4	510.7

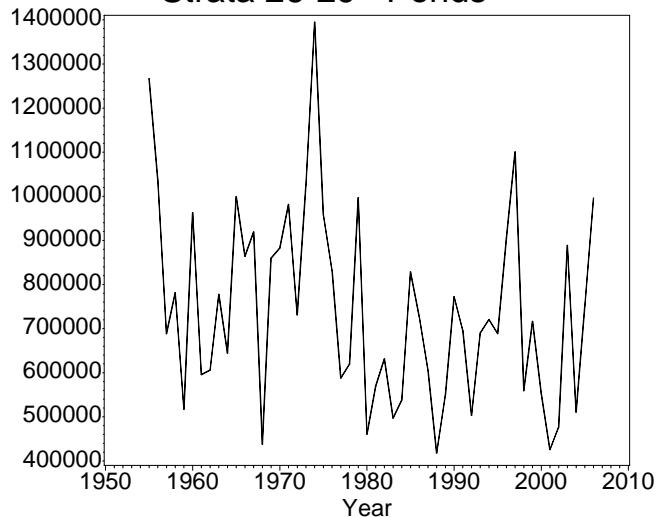
Species/Ponds	2005	2006
Ducks		
Dabblers		
Mallard	671.4	900.7
Am. black duck	0.0	0.0
Gadwall	338.2	455.2
Am. wigeon	125.5	188.6
Am. green-winged teal	158.5	177.9
Blue-winged teal	649.2	864.3
N. shoveler	547.6	700.8
N. pintail	282.3	611.0
Subtotal	2772.6	3898.5
Divers		
Redhead	91.3	154.3
Canvasback	42.7	76.3
Scaups	126.5	213.9
Ring-necked duck	12.9	21.5
Goldeneyes	10.6	50.4
Bufflehead	78.9	107.6
Ruddy Duck	42.7	58.3
Subtotal	405.6	682.2
Miscellaneous		
Long-tailed duck	0.0	0.0
Eiders	0.0	0.0
Scoters	0.3	4.3
Mergansers	1.9	1.6
Subtotal	2.2	5.9
Total Ducks	3180.4	4586.6
Canada Goose	212.2	181.5
Am. coot	240.9	419.0
Ponds	750.4	995.8



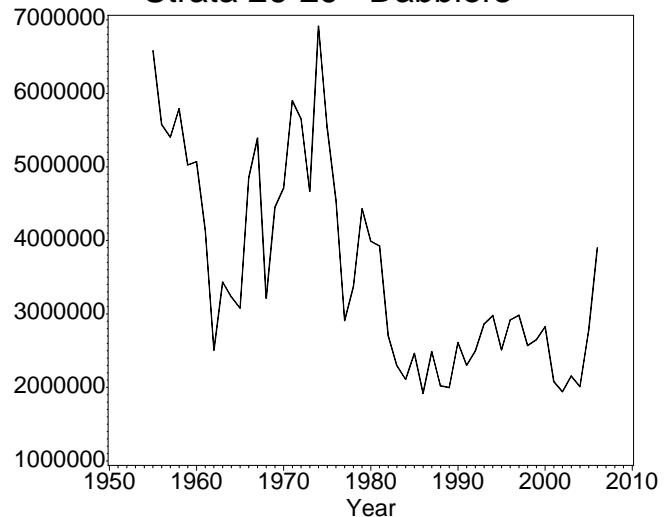




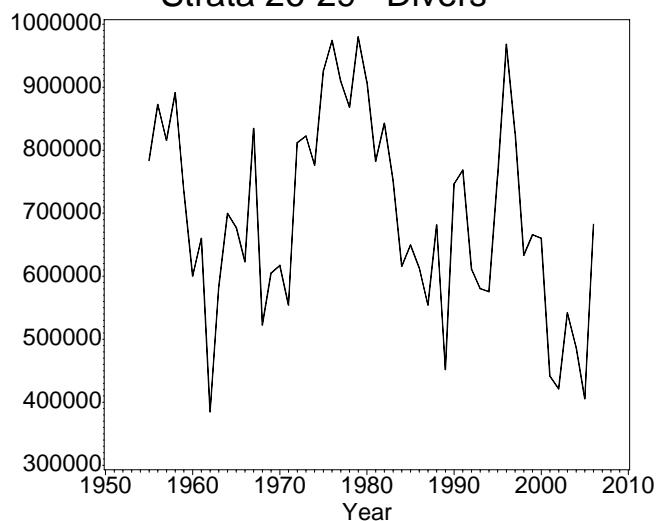
**Strata 26-29 Ponds**



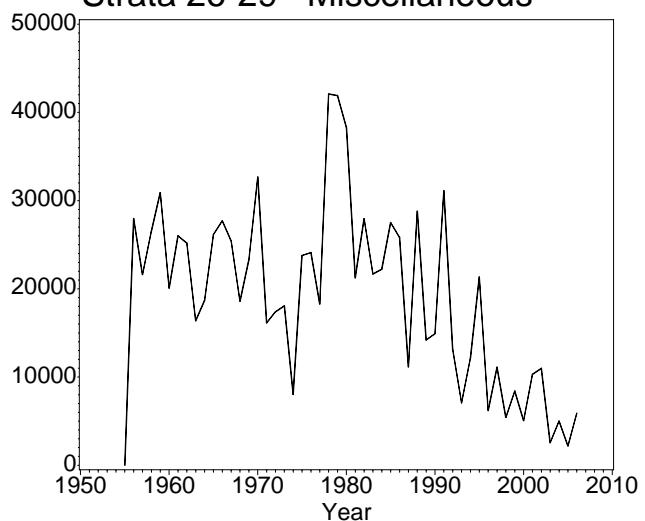
**Strata 26-29 Dabblers**



**Strata 26-29 Divers**



**Strata 26-29 Miscellaneous**



**Strata 26-29 Total Ducks**

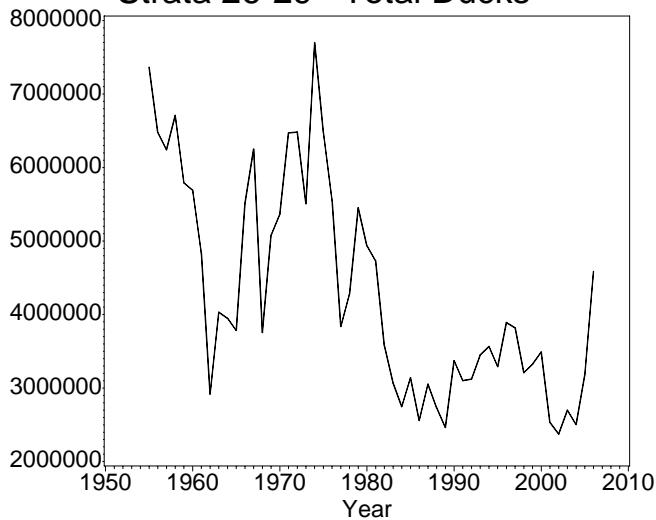


Table 4. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparison against the previous year and the previous long-term mean for Central Alberta.

Species/Ponds	Stratum (2006)					Long-Term Mean	% Change From Long-Term Mean		
	75	76	2006 Total	2005 Total	2005		2005	Long-Term Mean	
<b>Ducks</b>									
<b>Dabblers</b>									
Mallard	114.2	183.3	297.5	366.8	417.6	-18.9%	-28.7%		
Am. black duck	0.0	0.0	0.0	0.0	0.0	--	--		
Gadwall	61.7	37.2	98.8	60.5	64.8	63.3%	52.5%		
Am. wigeon	21.5	22.7	44.1	53.0	78.3	-16.7%	-43.6%		
Am. green-winged teal	75.4	127.8	203.1	157.3	115.6	29.1%	75.8%		
Blue-winged teal	99.4	75.8	175.3	217.0	150.6	-19.2%	16.4%		
N. shoveler	34.9	36.0	70.9	112.6	90.4	-37.0%	-21.6%		
N. pintail	17.1	11.9	29.0	16.5	18.7	75.8%	54.8%		
Subtotal	424.1	494.6	918.8	983.6	935.9	-6.6%	-1.8%		
<b>Divers</b>									
Redhead	31.0	16.2	47.1	30.8	32.6	52.9%	44.4%		
Canvasback	32.2	2.3	34.5	25.1	33.3	37.4%	3.6%		
Scaups	78.2	32.0	110.2	142.9	155.4	-22.9%	-29.1%		
Ring-necked duck	36.0	22.8	58.8	46.1	37.1	27.6%	58.6%		
Goldeneyes	16.6	9.6	26.1	8.6	47.1	204.8%	-44.5%		
Bufflehead	122.2	137.2	259.4	220.5	170.5	17.7%	52.2%		
Ruddy Duck	24.9	8.2	33.1	49.7	58.2	-33.4%	-43.1%		
Subtotal	341.0	228.4	569.3	523.7	534.2	8.7%	6.6%		
<b>Miscellaneous</b>									
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	--	--		
Eiders	0.0	0.0	0.0	0.0	0.0	--	--		
Scoters	5.9	3.0	8.9	5.1	8.4	75.5%	5.8%		
Mergansers	1.4	0.0	1.4	2.3	9.3	-37.7%	-84.7%		
Subtotal	7.3	3.0	10.3	7.4	17.7	40.6%	-41.6%		
Total Ducks	772.4	726.0	1498.4	1514.7	1487.8	-1.1%	0.7%		
Canada Goose	45.8	39.5	85.3	72.5	53.0	17.8%	60.9%		
Am. coot	168.9	20.2	189.2	215.4	158.2	-12.2%	19.6%		
Ponds	216.1	272.4	488.4	580.5	491.1	-15.9%	-0.5%		

Table 5. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year and the previous long-term mean for Central Alberta.

Year	Stratum (2006)		
	75	76	Total
1989	160.4	251.5	411.9
1990	174.4	315.5	489.9
1991	166.1	252.1	418.2
1992	137.2	282.0	419.2
1993	156.2	245.3	401.5
1994	147.2	238.2	385.4
1995	175.1	330.9	505.9
1996	239.3	329.6	569.0
1997	394.1	405.4	799.5
1998	170.5	225.5	395.9
1999	209.0	337.2	546.2
2000	129.0	298.2	427.2
2001	139.6	266.4	406.0
2002	184.8	387.8	572.5
2003	181.0	336.0	517.0
2004	172.7	329.3	502.1
2005	278.7	301.8	580.5
2006	216.1	272.4	488.4
1989-2005 Mean	189.1	301.9	491.1
Percent Change:			
From 2005	-22.5%	-9.7%	-15.9%
From 1989-2005 Mean	14.2%	-9.8%	-0.5%

Table 6. Survey design for Central Alberta, May 2006

	<u>STRATUM</u>		
	75	76	Total
<u>Survey design</u>			
Square miles in stratum	19,387	26,483	45,870
Square miles in sample-waterfowl	166.5	220.5	387
Square miles in sample-ponds	83.25	110.25	193.5
Lineal miles in sample	666	882	1,548
Number of transects in sample	4	5	9
Number of segments in sample	37	49	86
Expansion factor	116.4384	120.1043	--
<u>Current year coverage</u>			
Square miles in sample-waterfowl	175.5	220.5	396
Square miles in sample-ponds	87.75	110.25	200.25
Lineal miles in sample	702	882	1584
Number of transects in sample	4	5	9
Number of segments in sample	39	49	89
Expansion factor	110.47	120.10	

Appendix 2. Long-term trend in adjusted waterfowl breeding population estimates (thousands) for Central Alberta.

Species/Ponds	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ducks										
Dabblers										
Mallard	380.2	380.0	369.4	380.9	346.4	384.4	434.0	381.6	431.9	382.8
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	59.3	62.6	32.1	41.3	31.7	41.1	29.4	64.6	68.3	99.2
Am. wigeon	62.0	84.2	101.6	82.4	97.7	97.2	139.0	115.6	110.8	57.6
Am. green-winged teal	50.6	41.1	57.5	62.7	82.4	121.9	144.0	146.1	167.9	41.4
Blue-winged teal	161.3	160.2	127.2	158.2	55.6	95.1	76.1	163.6	117.0	183.4
N. shoveler	87.4	101.4	60.7	100.6	46.8	65.0	62.6	76.1	113.5	87.4
N. pintail	35.2	23.5	7.2	8.4	2.9	12.5	13.8	18.1	74.4	13.3
Subtotal	835.9	852.9	755.8	834.5	663.4	817.3	899.0	965.8	1083.8	865.0
Divers										
Redhead	21.7	26.3	15.0	72.8	31.7	23.1	9.6	18.4	35.7	50.2
Canvasback	28.9	37.6	5.6	13.7	59.0	42.8	10.6	90.4	26.7	61.3
Scaups	128.0	194.9	124.6	153.4	136.9	131.9	126.3	182.5	159.2	81.1
Ring-necked duck	24.7	20.2	18.0	15.5	25.1	88.2	86.2	44.2	26.1	32.2
Goldeneyes	28.5	50.6	39.4	25.2	39.4	55.7	71.0	16.4	73.5	47.0
Bufflehead	87.0	135.2	156.1	220.3	116.7	90.8	136.8	232.2	231.8	202.5
Ruddy Duck	64.7	44.2	5.7	62.8	60.7	4.9	27.5	57.6	7.5	194.8
Subtotal	383.6	509.1	364.4	563.8	469.6	437.4	468.1	641.7	560.6	669.1
Miscellaneous										
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	9.0	11.4	12.6	10.7	3.4	10.1	11.8	0.5	11.5	4.3
Mergansers	6.6	39.5	2.4	6.0	9.3	3.3	11.3	1.3	0.6	1.3
Subtotal	15.6	50.8	15.0	16.8	12.7	13.4	23.1	1.9	12.1	5.5
Total Ducks	1235.1	1412.8	1135.1	1415.1	1145.7	1268.1	1390.2	1609.4	1656.5	1539.7
Canada Goose	12.5	19.0	15.4	19.8	18.9	20.7	43.3	48.2	29.1	71.1
Am. coot	26.4	158.7	21.6	64.0	62.6	39.7	31.9	37.7	243.3	375.3
Ponds	411.9	489.9	418.2	419.2	401.5	385.4	505.9	569.0	799.5	395.9

Species/Ponds	1999	2000	2001	2002	2003	2004	2005	2006
Ducks								
Dabblers								
Mallard	640.5	516.8	503.3	546.5	275.0	378.0	366.8	297.5
Am. black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	68.6	56.9	86.6	131.2	56.8	111.3	60.5	98.8
Am. wigeon	93.0	44.3	61.5	45.4	37.8	47.7	53.0	44.1
Am. green-winged teal	174.0	327.3	70.7	184.1	40.0	95.7	157.3	203.1
Blue-winged teal	150.1	246.8	76.1	204.8	74.9	292.5	217.0	175.3
N. shoveler	78.4	99.1	101.0	157.6	73.7	113.2	112.6	70.9
N. pintail	19.8	10.8	5.9	15.5	18.3	22.0	16.5	29.0
Subtotal	1224.5	1301.9	905.1	1285.1	576.5	1060.5	983.6	918.8
Divers								
Redhead	82.9	18.0	20.1	21.9	19.4	57.2	30.8	47.1
Canvasback	34.5	10.6	24.9	26.1	43.8	24.8	25.1	34.5
Scaups	207.0	181.0	208.7	144.2	138.3	201.7	142.9	110.2
Ring-necked duck	61.8	28.5	32.0	6.7	36.7	38.1	46.1	58.8
Goldeneyes	9.9	35.1	58.7	31.3	161.4	48.3	8.6	26.1
Bufflehead	190.3	133.9	163.9	193.4	171.1	215.3	220.5	259.4
Ruddy Duck	27.3	67.8	31.0	82.3	119.4	80.8	49.7	33.1
Subtotal	613.7	474.9	539.2	505.8	690.2	666.3	523.7	569.3
Miscellaneous								
Long-tailed duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Eiders	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scoters	2.9	8.8	16.2	2.8	1.6	20.8	5.1	8.9
Mergansers	9.3	15.5	18.9	22.1	2.3	5.4	2.3	1.4
Subtotal	12.2	24.3	35.1	24.9	3.9	26.2	7.4	10.3
Total Ducks	1850.4	1801.1	1479.4	1815.8	1270.5	1753.0	1514.7	1498.4
Canada Goose	93.8	114.5	76.7	85.0	69.0	92.0	72.5	85.3
Am. coot	142.4	548.6	48.9	386.8	57.3	228.3	215.4	189.2
Ponds	546.2	427.2	406.0	572.5	517.0	502.1	580.5	488.4

